



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE

United States Patent and Trademark Office

Address: COMMISSIONER FOR PATENTS

P.O. Box 1450

Alexandria, Virginia 22313-1450

www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/800,008	03/15/2004	Noriya Hayashi	080542-0166	6818
22428 7590 04/24/2009 FOLEY AND LARDNER LLP SUITE 500 3000 K STREET NW WASHINGTON, DC 20007				
EXAMINER				
GILLESPIE, BENJAMIN				
ART UNIT		PAPER NUMBER		
1796				
MAIL DATE		DELIVERY MODE		
04/24/2009		PAPER		

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

# Office Action Summary

**Application No.**

10/800,008

**Applicant(s)**

HAYASHI ET AL.

**Examiner**

BENJAMIN J. GILLESPIE

**Art Unit**

1796

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 27 January 2009.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 4-18 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 4-18 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SE/US)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_

***Continued Examination Under 37 CFR 1.114***

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 1/27/2009 has been entered.

***Claim Rejections - 35 USC § 112***

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. **Claims 5, 7-12, 16-18** are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.
3. **Regarding claims 5, 10, 11, and 17:** The language "[a] fiber reinforced plastic according to" renders the claims indefinite because it is not clear of "a fiber" is the same as the fiber reinforced plastic of independent claim 4.
4. **Regarding claims 7-9, 12, 16, and 18:** Similarly, the language "[a] production process of a fiber reinforced plastic according to" renders the claims indefinite because it is not clear of "a production process" is the same as the production process of independent claim 6.

***Double Patenting***

5. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined

Art Unit: 1796

application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

6. A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

7. Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

8. **Claims 4, 5, 10, 11, and 17** are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 2, 44, 47, 49, and 50 of copending Application No. 10/807,737. Although the conflicting claims are not identical, they are not patentably distinct from each other.

9. **Regarding claim 4:** Claims 2 and 44 of application 10/807,737 teach cured, fiber reinforced polyurethane, that is the reaction product of bifunctional and/or trifunctional isocyanate and polyol at a molar ratio of NCO:OH ranging from 0.9:1 to 1.1:1, wherein the polyol has a molecular weight between 100 and 250. While the claims teach the glass transition temperature of the reaction mixture, they fail to list T<sub>g</sub> of the cured polyurethane or specify the composition is a thermoset.

10. Nevertheless, portions of the specification which provide support for the patent claims may also be examined and considered when addressing the issue of whether a claim in the application defines an obvious variation of an invention claimed in the patent. *In re Vogel*, 422 F.2d 438, 441-42, 164 USPQ 619, 622 (CCPA 1970).

11. With this understanding, applicants' attention is drawn to paragraph 66 and table 2 of the corresponding PG Publication of applicants' specification (2004/0198923) which states the polyurethane is thermoset and has a Tg of 95°C.
12. **Regarding claim 5:** Paragraph 61 of PG Pub (2004/0198923), teaches amounts of material that satisfy the claimed ranges.
13. **Regarding claim 10 and 11:** Claim 2 of application 10/807,737 teaches the polyol comprises at least 50 wt% of polypropylene glycol, and paragraph 40 of PG Pub (2004/0198923) states the polyol is bifunctional.
14. **Regarding claim 17:** As previously discussed, paragraph 66 of PG Pub (2004/0198923) states the polyurethane has a Tg of 95°C.
15. This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.
16. **Claims 4-12 and 17-18** are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-18 of copending Application No. 10/492,940. Although the conflicting claims are not identical, they are not patentably distinct from each other.
17. **Regarding claims 4:** Claim 1 of application 10/492,940 teach cured, thermoset, fiber reinforced polyurethane, that is the reaction product of bifunctional and/or trifunctional isocyanate and polyol at a molar ratio of NCO:OH ranging from 0.9:1 to 1.1:1, wherein the polyol has a molecular weight between 100 and 250. While the claims teach the glass transition temperature of the reaction mixture, they fail to list Tg of the cured polyurethane.

18. Nevertheless, portions of the specification which provide support for the patent claims may also be examined and considered when addressing the issue of whether a claim in the application defines an obvious variation of an invention claimed in the patent. *In re Vogel*, 422 F.2d 438, 441-42, 164 USPQ 619, 622 (CCPA 1970).

19. With this understanding, applicants' attention is drawn to paragraph 25 of applicants' corresponding PG Publication (2005/0072522) which teaches a Tg as high as 70°C.

20. Furthermore, while it is noted that the instantly claimed invention has the language "wherein the polyol does not comprise a chain extender" and claim 1 of application 10/492,940 list chain extenders – claim 1 of application 10/492,940 still applicable since the polyol listed in claim 4 of the instant application is the identical to the chain extenders listed in application 10/492,940. The fact that they are referred to as chain extenders is pure semantics – the same compounds are being used in identical reaction systems.

21. **Regarding claims 5 and 12:** Paragraph 35 of PG Pub (2005/0072522) teaches fibrous material present in amounts that satisfy the claimed range.

22. **Regarding claim 6 and 9:** Claims 1, 2, and 4 of application 10/492,940 teach mixing the reactants at room temperature, applying the mixture to two fibrous layers, stacking said layers together thereby causing them to stick together.

23. **Regarding claims 7, 8, 10, and 11:** Claim 3 of application 10/492,940 states the polyol comprises bifunctional polypropylene glycol by as much as 50 wt%.

24. **Regarding claims 17 and 18:** As previously discussed, paragraph 25 of PG Pub (2005/0072522) teaches a Tg of 70°C.

25. This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

*Claim Rejections - 35 USC § 102/103*

26. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102(b) 103(a) that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

27. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

28. **Claims 4, 6, 11, 16, 17 and 18** are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Fukami et al (U.S. Patent 5,071,613).

29. **Regarding claim 4:** Fukami et al teach cured, fiber reinforced thermoset polyurethane that is the reaction product of polyisocyanates, and polyol (Abstract).

30. The polyisocyanate comprise bi and trifunctional compounds such as carbodiimide modified diisocyanate and polyphenylene polymethylene polyisocyanate, which are liquid at

room temperature (Col 2 lines 30-46). The polyol comprises both bi and tri functional compounds including polypropylene glycol, wherein the polyol has hydroxyl numbers ranging from 300 to 800 – which when calculated with functionalities of 2 and 3 result in molecular weights as low as 140 and 210 respectively (Col 2 lines 50-56; col 3 lines 19-24). The polyisocyanate and polyol are present in an NCO:OH ratio which is preferably 1:1 (Col 4 lines 14-19).

31. Regarding the claimed “thermoset”, glass transition temperature, and “shape memory” limitations, the polyurethane of Fukami et al is produced by reacting low molecular weight bi and tri-functional compound, which would results in a branched network, i.e. thermoset polymer.

32. Although Fukami et al are silent in teaching the glass transition temperatures of the resulting polyurethane, said polyurethane would inherently exhibit the claimed glass transition temperatures since it is based on analogous reactants present in identical amounts.

33. Furthermore, “the PTO can require an applicant to prove that the prior art products do not necessarily or inherently possess the characteristics of his [or her] claimed product. Whether the rejection is based on inherency’ under 35 U.S.C. 102, on prima facie obviousness’ under 35 U.S.C. 103, jointly or alternatively, the burden of proof is the same...[footnote omitted].” The burden of proof is similar to that required with respect to product-by-process claims. In re Fitzgerald, 619 F.2d 67, 70, 205 USPQ 594, 596 (CCPA 1980) (quoting In re Best, 562 F.2d 1252, 1255, 195 USPQ 430, 433-34 (CCPA 1977)).

34. **Regarding claim 6:** Fukami et al teach that a “liquid is uniformly impregnated into [a] fibrous reinforcing material and [then] cured”. The impregnation occurs in a heated mold and



the liquid comprises both the polyisocyanate and polyol, which is taken to satisfy the “mixing” limitation (Col 2 lines 5-10; col 3 lines 61-65; col 4 lines 10-13).

35. **Regarding claim 11:** The polyol may be bi-functional (Col 2 lines 50-51).

36. **Regarding claim 16:** Although not preferred by the prior art, the resin transfer molding method is still anticipated by Fukami et al since it is disclosed as being an available process for producing shape memory polyurethane (Col 1 lines 19-21).

37. **Regarding claims 17 and 18:** As previously discussed, the polyol has molecular weights between 140 and 210, and the polyurethane inherently shares the same glass transitions as claimed by applicants.

38. **Claims 4-8, 10-12, and 17-18** are rejected under 35 U.S.C. 103(a) as being unpatentable over Fukami et al (‘613) in view of Herrington et al (‘622).

39. **Regarding claim 4:** As previously discussed, Fukami et al teach cured, thermoset shape memory polyurethane that is the reaction product of polyisocyanate and polyol. However, there is no discussion of what the resulting glass transition temperatures are for said polyurethane.

40. Herrington et al also teach cured thermoset shape memory polyurethane that is the reaction product of di and tri-functional polyisocyanate and di and tri-functional polyol. The glass transition temperature of the polyurethane may extend to 120°C, wherein said T<sub>g</sub> is controlled by the selection of reactant (Col 3 lines 4-10; 49-51).

41. Therefore, it would have been obvious to use a polyurethane in Fukami et al having a T<sub>g</sub> that coincides with applicants’ claimed range because it is disclosed as being suitable for analogous thermoset, shape-memory polyurethane, and a reasonable expectation of success has been established in arriving at said T<sub>g</sub> since Herrington et al teach how it is controlled.

Furthermore, one would be motivated to raise the T<sub>g</sub> to temperatures of 120°C since it would prevent unwanted deformation at elevated temperatures, i.e. 80°C.

42. **Regarding claim 6:** Fukami et al teach that a “liquid is uniformly impregnated into [a] fibrous reinforcing material and [then] cured”. The impregnation occurs in a heated mold and the liquid comprises both the polyisocyanate and polyol, which is taken to satisfy the “mixing” limitation (Col 2 lines 5-10; col 3 lines 61-65; col 4 lines 10-13).

43. **Regarding claim 5 and 12:** As previously discussed Fukami et al teach fiber reinforced, thermoset, shape memory polyurethane but fail to teach how much fiber reinforcement is present in said polyurethane. Nevertheless, one of ordinary skill would understand that the content of fiber reinforcement impacts the mechanical resiliency of the resulting polyurethane, i.e. the fiber content is a result effective variable.

44. Therefore, it would have been obvious to arrive at applicants’ claimed range since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

45. **Regarding claims 7 and 10:** While Fukami et al teach polyol comprising polypropylene glycol, there is no teaching stating that it is present by at least 50 wt%. Herrington et al teach it is preferred to use polyol consisting of 98 equivalent percent of propylene oxide since it results in superior shape memory thermosets (Col 3 lines 49-53).

46. Thus, it would have been obvious to arrive at applicants’ claimed range since it is disclosed by Herrington et al as being the preferred polyol composition in analogous thermoset shape memory polyurethane, and Fukami et al teach polypropylene glycol as a suitable polyol.

47. **Regarding claims 8 and 11:** The polyol of Fukami et al has a functionality of two (Col 3 lines 54-56).
48. **Regarding claims 17 and 18:** As previously discussed, Fukami et al teach polyol having molecular weights as low as 140 and it would have been obvious to arrive at the claimed Tg range – see paragraph 38-40 of the instant rejection.
49. **Claims 5 and 12** are rejected under 35 U.S.C. 103(a) as being unpatentable over Fukami et al ('613) in view of Recker et al (U.S. Patent 4,251,428).
50. **Regarding claim 5 and 12:** As previously discussed Fukami et al teach fiber reinforced, thermoset, shape memory polyurethane, but fail to teach amounts of fiber.
51. Recker et al also disclose fiber reinforced, thermoset, shape memory polyurethane and column 11 lines 49-54 teach that the fiber content impacts the mechanical resiliency of the resulting polyurethane - it is preferred to include between 5 and 60 wt% of fiber reinforcement which is taken to satisfy the range of claims 5 and 12 (Abstract; col 5 lines 3-6).
52. Hence, it would have been obvious to add fiber reinforcement in an amount that satisfies claims 5 and 12 since it is disclosed by Recker et al as being the amount useful in thermoset shape memory polyurethane.
53. **Claims 5 and 12** are rejected under 35 U.S.C. 103(a) as being unpatentable over Fukami et al ('613) in view of Herrington et al ('622) in further view of Recker et al ('428).
54. **Regarding claim 5 and 12:** As previously discussed Fukami et al in view of Herrington et al render obvious shape memory polyurethane, but fail to teach a fiber content.
55. Recker et al also disclose fiber reinforced, thermoset, shape memory polyurethane and column 11 lines 49-54 teach that the fiber content impacts the mechanical resiliency of the

resulting polyurethane - it is preferred to include between 5 and 60 wt% of fiber reinforcement which is taken to satisfy the range of claims 5 and 12 (Abstract; col 5 lines 3-6).

56. Hence, it would have been obvious to add fiber reinforcement in an amount that satisfies claims 5 and 12 since it is disclosed by Recker et al as being the amount useful in thermoset shape memory polyurethane.

57. **Claim 9** is rejected under 35 U.S.C. 103(a) as being unpatentable over Fukami et al ('613) in view of Blenner et al (U.S. Patent 4,738,999).

58. As previously discussed Fukami et al teach fiber reinforced polyurethane, wherein combinations of various fibers may included in the polyurethane depending on the desired performance of the final product (Col 4 lines 44-62). However, Fukami et al fail to teach a method of producing laminates corresponding to claim 9.

59. Blenner et al teach fiber reinforced polyurethane, wherein multiple layers of impregnated polyurethane resin may be stacked together and cured with heat and pressure causing the individual layers to stick thereby forming a laminate (Col 5 lines 18-34).

60. With this understanding, and the fact that Fukami et al teach it is preferred to have various types of fibrous material, one would be motivated to use the method of Blenner et al in Fukami et al since it allows the user to combine numerous layers of polyurethane - each having a different type of fibrous material - without having to impregnate all the various types of fibrous material at once (Fukami et al: col 4 lines 54-58).

61. **Claims 9** is rejected under 35 U.S.C. 103(a) as being unpatentable over Fukami et al ('613) in view of Herrington et al ('622) in further view of Blenner et al ('999).

62. As previously discussed, Fukami et al in view of Herrington et al render obvious fiber reinforced polyurethane that may comprise combinations of various fibers depending on the desired performance of the final product (Col 4 lines 44-62). However, neither Fukami et al nor Herrington et al teach the method of claim 9.

63. Blenner et al teach fiber reinforced polyurethane, wherein multiple layers of impregnated polyurethane resin may be stacked together and cured with heat and pressure causing the individual layers to stick thereby forming a laminate (Col 5 lines 18-34).

64. With this understanding, and the fact that Fukami et al teach it is preferred to have various types of fibrous material, one would be motivated to use the method of Blenner et al in Fukami et al since it allows the user to combine numerous layers of polyurethane - each having a different type of fibrous material - without having to impregnate all the various types of fibrous material at once (Fukami et al: col 4 lines 54-58).

#### ***Response to Arguments***

65. Applicant's arguments with respect to claims 4-12, and 16-18 have been considered but are moot in view of the new ground(s) of rejection.

66. Specifically, the newly presented rejection addresses applicants' concerns regarding shape-memory polyurethane - Fukami et al teach the thermoset polyurethane as a shape memory composition.

#### ***Conclusion***

67. Any inquiry concerning this communication or earlier communications from the examiner should be directed to BENJAMIN J. GILLESPIE whose telephone number is (571)272-2472. The examiner can normally be reached on 8am-5:30pm.

68. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Vasu Jagannathan can be reached on 571-272-1119. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

69. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Benjamin J Gillespie/  
Examiner, Art Unit 1796

/Vasu Jagannathan/  
Supervisory Patent Examiner, Art Unit 1796